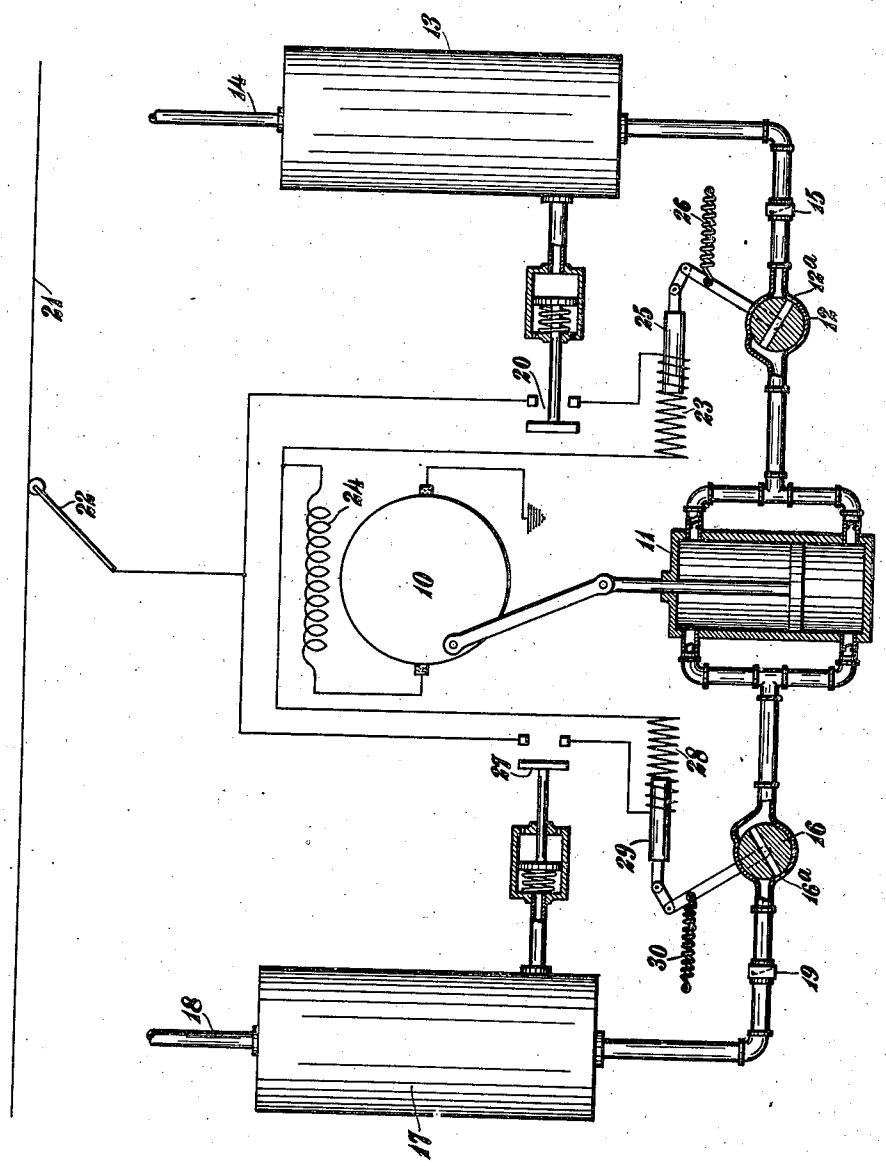
G. B. SCHLEY.

PRESSURE CONTROL SYSTEM.

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1,185,944.

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Witnesses

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PRESSURE-CONTROL SYSTEM.

1,185,944. Specification of Letters Patent. Patented June 6, 1916.

Application filed November 3, 1906. Serial No. 341,828.

To all whom it may concern:

Be it known that I, GEORGE B. SCHLEY, a citizen of the United States, residing at Norwood, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Pressure-Control Systems, of which the following is a full, clear, and exact specification.

My invention relates to pressure control systems.

In some systems where fluid pressure is used it is desirable that a number of different pressures be obtainable. Very often it is desirable not to attempt to obtain these different pressures from a source of highest pressure by means of pressure reducing valves, but to obtain each pressure from a separate reservoir supplied directly by a pump. However, if each reservoir has a separate pump the expense of installing the system is unduly great, and as the pumps would then work only part of the time, much of the time the investment would be idle. But as each reservoir needs a pump but part of the time it would be advantageous to have the same pump for a number of reservoirs so that it would restore the proper pressure in one reservoir when not operatively connected to another. And by proper arrangements the same pump can simultaneously restore different pressures in a plurality of reservoirs.

My present invention has for its object to produce an improved fluid pressure system comprising a plurality of reservoirs, a single pump, means for driving the pump and control devices responsive to the fluid pressure in the reservoirs.

In the specific embodiment of my invention which is here illustrated are shown two reservoirs, one for compressed air and one for rarefied air, and a single pump driven by an electric motor, together with electric and penumatic connections so arranged that the pump will operate whenever the condition of fluid in either reservoir demands it and that reservoir will then be connected to the outlet or intake of the pump as the case may be. With this arrangement two different predetermined pressures are obtainable.

In one broad aspect my invention consists of the combination of a pump driven by an electric motor, a plurality of reservoirs, a pressure switch connected to each reservoir, and electrical connections whereby the motor circuit is completed when any of said switches is closed.

In another broad aspect my invention consists of a fluid pressure system comprising a pump, a motor for driving the pump, a plurality of reservoirs, and means governed by the pressure in each reservoir for connecting said reservoir to the pump whenever said pressure departs from normal and disconnecting said reservoir from the pump when said pressure is restored to normal, and for rendering the pump-driving motor operative and inoperative as said pressure varies.

Other novel features of my invention will appear from the description and drawings and will be particularly pointed out in the claims.

The single figure of the drawings represents diagrammatically one embodiment of my invention.

In this figure the motor 10 is mechanically connected to an air pump 11. By means of a valve 12 the outlet side of the pump may be connected either through an opening 12^a to the atmosphere as shown, or to a reservoir 13 for compressed air. From this reservoir 13 compressed air can be drawn for any desired purpose through a pipe 14. A check valve 15 prevents any backward flow of the air from the reservoir 13 to or through the valve 12. The intake side of the pump 11 may be connected by a valve 16 either through an opening 16^a to the atmosphere as shown, or to a reservoir 17 for rarefied air or a partial vacuum. The reservoir 17 may be connected by means of a pipe 18 to any desired apparatus from which air is to be withdrawn. A check valve 19 prevents any backward flow of air through the valve 16 into the reservoir 17. Both the intake and the outlet of the pump 11 are normally connected to the atmosphere.

Connected to the reservoir 13 is a pressure switch 20, preferably an adjustable snap switch. This switch is responsive to the pressure in the reservoir 13 and closes when the pressure in said reservoir decreases below a predetermined minimum and opens when said pressure rises above a predetermined maximum. When closed this switch completes the circuit of the motor 10 from the trolley wire 21 to the trolley 22, switch 20, solenoid 23, motor field winding 24, and motor armature 10 to the ground. The

solenoid 23 when energized moves its core 25 against the spring 26 to operate the valve 12 to connect the outlet of the pump 11 to the reservoir 13.

Connected to the reservoir 17 is a pressure switch 27, also preferably an adjustable snap switch. This switch closes when the pressure in the reservoir 17 exceeds a predetermined maximum, thus completing the motor circuit from the trolley 22 through the switch 27, solenoid 28, motor field winding 24, and motor armature 10 to ground. The solenoid 28 when energized moves its core 29 against the spring 30 to operate the valve 16 to connect the reservoir 17 to the intake of the pump 11. The pressure switch 27 opens when the pressure in the reservoir 17 is reduced to a predetermined minimum. The switches 20 and 27 together with the solenoids 23 and 28 respectively are in shunt to each other between the trolley 22 and the motor field winding 24. When either one of these switches is closed the motor will operate to drive the pump 11.

The operation of the system is as follows:— When the pressures in both reservoirs 13 and 17 are within the predetermined limits for which the switches 20 and 27 are set, the parts are as shown in the drawing, with the motor and pump at rest and the intake and outlet of the pump both connected to the atmosphere. Should the pressure in reservoir 13 fall below its lower limit the switch 20 will close to complete the motor circuit and to cause the operation of the valve 12 to connect the outlet of the pump 11 to the reservoir 13. The pump 11 will now operate to pump air to the reservoir 13 from the atmosphere, the switch 27 still being open, and will continue to do so until the pressure in said reservoir attains the desired maximum, when the switch 20 will open to break the motor circuit and allow the spring 26 to operate the valve 12 to disconnect the outlet of the pump 11 from the reservoir 13 and connect it to the atmosphere.

Should the pressure in the reservoir 17 rise above the predetermined maximum for which the switch 27 is set, the said switch 27 will close to complete the motor circuit and to cause the valve 16 to be operated to connect the reservoir 17 to the intake of the pump 11. The pump 11 will now be operated by the motor 10 to exhaust air from the reservoir 17 to the atmosphere, the switch 20 being open. This continues until the pressure in reservoir 17 reaches the desired minimum, when the switch 27 will open to break the motor circuit and allow the spring 30 to operate the valve 16 to disconnect the intake of the pump 11 from the reservoir 17 and connect it to the atmosphere.

Should both the switches 20 and 27 be closed simultaneously because the pressure in reservoir 13 falls too low and that in reservoir 17 rises too high, the motor will operate the pump to exhaust the air from the reservoir 17 and supply it to the reservoir 13. At this time both the valves 12 and 16 are arranged to connect their respective reservoirs to the pump. When the pressure in either reservoir reaches that desired, its switch will open to disconnect said reservoir from the pump, but the pump will not cease to operate until both switches 20 and 27 have opened, at which time the respective pressures in the two reservoirs will be those desired.

Although I have shown my invention as applied to a combined vacuum and compression system, it is not limited to such. There may be any desired number of reservoirs with their independent pressure switches and valves corresponding to the switches 20 and 27 and the valves 12 and 16 upon either the compression or the vacuum side of the system, with the switches for the different reservoirs set for different pressures. With such an arrangement in case two or more reservoirs are simultaneously connected to the same side of the pump through the operation of the corresponding valves 12 or 16, the pump will work on said reservoirs, either supplying or exhausting, until the pressure in the reservoir whose normal pressure is nearest atmospheric has been brought to the desired normal value, at which time this reservoir will be disconnected from the pump through the actuation of its valve 12 or 16; and following such disconnection, the pressure in that one of the remaining reservoirs whose normal pressure is next nearest to atmospheric will be raised or lowered to the desired normal value, and this reservoir will then be disconnected through the actuation of its corresponding valve 12 or 16. This operation will continue until the pressure in each reservoir is restored to normal.

I have shown and described my invention as applied to an electric railway car, but obviously it is not limited to such use but may be used in any place where a pluralitiy of different fluid pressures are desired; neither is it limited to the use of an electric motor as the pump-driving means, for, obviously, any suitable type of motor or prime mover may be used for operating the pump.

My invention is equally applicable to any other fluid pressure systems whether gaseous or liquid, and is not limited to air pressure systems.

Many other modifications can also be made and in the following claims I aim to cover all such which do not involve a departure from the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent is:—

1. A fluid pressure system, comprising a pump, a motor for driving said pump, a plu-

rality of reservoirs, and means governed by the pressure in each reservoir for connecting said reservoir to the pump and effecting the starting of the pump-driving motor whenever said pressure departs from its normal value and disconnecting said reservoir from the pump and effecting the stopping of the pump-driving motor when said pressure is restored to its normal value.

2. A fluid pressure system, comprising an electric motor, a pump driven thereby, a plurality of reservoirs, and means governed by the pressure in each reservoir for connecting said reservoir to the pump whenever said pressure departs from its normal value and disconnecting said reservoir from the pump when said pressure is restored to its normal value, and for completing the motor circuit when any reservoir is connected to the pump.

3. In a fluid pressure system, the combination of an electric motor, a pump driven thereby, a plurality of reservoirs, and a fluid pressure governed device for each reservoir for controlling the current supply to the motor and the connection between that reservoir and the pump.

4. In a fluid pressure system, the combination of an electric motor, an air pump driven thereby, a plurality of reservoirs, and a pressure switch responsive to the pressure in each reservoir to control the electrical connections of the motor and the pneumatic connections of that reservoir to the pump.

5. In a fluid pressure system, the combination of an electric motor, an air pump driven thereby, two reservoirs, a switch responsive to the extent of rarefaction in one reservoir, a second switch responsive to the pressure in the other reservoir, and electrical connections whereby said switches simultaneously and independently control the motor circuit.

6. In a fluid pressure system, the combination of an electric motor, an air pump driven thereby, two reservoirs, a switch responsive to the extent of rarefaction in one reservoir, a second switch responsive to the pressure in the other reservoir, and electrical connections whereby said switches simultaneously control the motor circuit.

7. In a fluid pressure system, the combination of an air pump, means for driving said pump, a compressed air reservoir, a rarefied air reservoir, and two fluid pressure devices for controlling the pneumatic connections between the two reservoirs respectively and the pump and for controlling the operation of the pump-driving means.

8. In a fluid pressure system, the combination of an electric motor, an air pump driven thereby, a compressed air reservoir, a rarefied air reservoir, and two fluid pressure devices respectively responsive to the pressure in the two reservoirs for controlling the electrical connections of the motor and the pneumatic connections between the pump and the two reservoirs respectively.

9. In a fluid pressure system, the combination of an air pump, a motor for driving said pump, two reservoirs, and a fluid pressure device responsive to the pressure in each reservoir, one to control the pneumatic connection between its reservoir and the outlet side of the pump and the other to control the pneumatic connection between its reservoir and the intake side of the pump, and both of said devices controlling the operation of the pump-driving motor.

10. In a fluid pressure system, the combination of an electric motor, an air pump driven thereby, two reservoirs, and a fluid pressure device responsive to the pressure in each reservoir, one to control the pneumatic connection between its reservoir and the outlet side of the pump and the other to control the pneumatic connection between its reservoir and the intake side of the pump, and each controlling the motor circuit.

11. In a fluid pressure system, the combination of an electric motor, an air pump driven thereby, two reservoirs, a valve for connecting the intake side of the pump to one of the reservoirs or to the atmosphere, a valve for connecting the outlet side of the pump to the other reservoir or to the atmosphere, and means for automatically controlling said valves and the circuit of the motor in response to the pressures in the reservoirs.

12. In a fluid pressure system, the combination of an electric motor, an air pump driven thereby, two reservoirs, a valve for connecting the intake side of the pump to one of the reservoirs or to the atmosphere, a valve for connecting the outlet side of the pump to the other reservoir or to the atmosphere, and fluid pressure responsive devices for automatically controlling said valves respectively in response to the pressures in the two reservoirs respectively and for also controlling the motor circuit.

13. A fluid pressure system, comprising an electric motor, a pump driven thereby, two reservoirs, and two pressure switches responsive to the pressure in the two reservoirs respectively, said switches being in shunt to each other and in the motor circuit.

14. A fluid pressure system, comprising an electric motor, a pump driven thereby, a plurality of reservoirs associated with the pump, and a pressure switch responsive to the pressure in each reservoir, said switches all being in the motor circuit and independently controlling the motor.

15. A fluid pressure system, comprising an electric motor, a pump driven thereby, a

plurality of reservoirs, and a pressure switch responsive to the pressure in each reservoir, said switches all being in the motor circuit and in shunt to each other.

16. In combination, an electric motor, a pump driven thereby, two reservoirs, a pressure switch connected to each reservoir, and electrical connections whereby the motor circuit is completed when either switch is closed.

17. In combination, an electric motor, a pump driven thereby, two reservoirs, a pressure switch connected to each reservoir, electrical connections whereby the motor circuit is completed when either switch is closed, and means for connecting one of the reservoirs to the intake of the pump when its associated switch is closed.

18. In combination, an electric motor, a pump driven thereby, two reservoirs, a pressure switch connected to each reservoir, electrical connections whereby the motor circuit is completed when either switch is closed, and means for connecting one of the reservoirs to the outlet of the pump when its associated switch is closed.

19. In combination, an electric motor, a pump driven thereby, two reservoirs, a pressure switch connected to each reservoir, electrical connections whereby the motor circuit is completed when either switch is closed, and means for connecting the reservoirs to the intake and the outlet of the pump respectively when their respective associated switches are closed.

20. In combination, an electric motor, a pump driven thereby, two reservoirs, a pressure switch connected to each reservoir, electrical connections whereby the motor circuit is completed when either switch is closed, and means for connecting the reservoirs to the pump when their respective switches are closed.

21. In combination, an electric motor, a pump driven thereby, a plurality of reservoirs, a pressure switch connected to each reservoir, electrical connections whereby the motor circuit is completed when any switch is closed, and means for connecting the reservoirs to the pump when their respective switches are closed.

22. In a combined pressure and vacuum system, the combination of a pressure reservoir, a vacuum reservoir, a pump, a motor for driving said pump, and means responsive to the pressures in said reservoirs for causing the starting or stopping of said motor and the consequent operation or discontinuation of operation of said pump and the connection of one or the other of said reservoirs to said pump or the disconnection thereof.

23. In a fluid pressure system, the combination of a pump, means for driving said pump, a plurality of reservoirs, and means responsive to the pressure of fluid in each reservoir for controlling the operation of the pump-driving means and the connections between the pump and the corresponding reservoir.

In testimony whereof I affix my signature, in the presence of two witnesses.

GEORGE B. SCHLEY.

Witnesses:
VICTOR E. JULLIEN,
ARTHUR F. KWIS.